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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/602,236	06/24/2003	Bruce H. Storm	1391-34500	8527
23505	7590	10/20/2004	EXAMINER	
CONLEY ROSE, P.C. P. O. BOX 3267 HOUSTON, TX 77253-3267			VERBITSKY, GAIL KAPLAN	
			ART UNIT	PAPER NUMBER
			2859	

DATE MAILED: 10/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/602,236	STORM ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Gail Verbitsky	2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 June 2004 and 29 July 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-89 is/are pending in the application.
- 4a) Of the above claim(s) 9,29-44,49,66,77 and 85-89 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8,10-25,27-28,45-48,50-65,67-76 and 78-84 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 9,26,29-44,49,66,77 and 85-89 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                                                                               |                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                                                   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                                          | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>06/01/2004</u> | 6) <input type="checkbox"/> Other: _____                                                |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election without traverse of Invention I, claims 1-28 and 45-85, and species of claims 8, 25, 48, 65, 76, 84 in the reply filed on June 11, 2004 is acknowledged. Accordingly, claims 29-44, 86-89 and 9, 26, 49, 66, 77 and 85 are withdrawn from further consideration as drawn to non-elected invention/ species.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 2, 16, 45 and 56 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. The terms "mini-", "micro" in claims 16 and 56 are relative terms, which renders the claim indefinite. The terms "mini-", "micro" are not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Therefore, the Examiner considers any pump for pumping milli-units as a mini-pump.

5. The term "micro-capillary" in claims 2 and 45 a relative term which renders the claim indefinite. The term "micro-capillary" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Therefore, the Examiner considers that the heat exchanger used with an electronic thermal component is a micro-capillary exchanger for its small size.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 3, 7-8, 10-11, 25, 27-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Chrysler et al. (U.S. 5456081) [hereinafter Chrysler.

Chrysler discloses in Fig. 2 a temperature management system 10 for temperature management of a thermal component (heat generating component) 20, 21, the system comprises a cold plate heat exchanger 50 having a plurality of thermoelectric modules (micro-capillary) 40 thermally coupled (by heat radiation) to the component, a heat sink, a thermal transfer plate (thermal conduit system) 30 thermally coupling the heat exchanger with the heat sink. The heat is conducted through the thermoelectric modules 40 of the thermal conduit to a heat sink where it can be removed by any convenient cooling fluid (col. 4, lines 1-6). Thus, in a broad sense, it is considered, that Chrysler suggests a phase change eutectic material as a cooling fluid. For claim 3: the thermal conduit 30 is a heat (thermally) conductive material plate.

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For claim 25: the capillary system (thermoelectric module) 31, 51 is a part of the thermal conduit 30 and comprises a fluid transfer device (fins) 35 cooling fluid (cold side 44), and the thermal conduit is a closed loop system.

For claims 7-8: the thermal component is a heat-generating component that overheats during operating or, inherently, when the integrated circuit overheats (component placed in a higher temperature).

For claim 27: as shown in Fig. 2, the heat exchanger is thermally coupled to the thermal component.

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1, 4-5, 10-14, 25, 27-28 are rejected under 35 U.S.C. 102(e) as being Chou et al. (U.S. 20020144811) [hereinafter Chou].

Chou discloses in Fig. 4 a device in the field of applicant's endeavor comprising a thermal component (heat source) 110, a heat collector (cold plate/ heat exchanger) 204, a thermal conduit 202, a heat sink 302 and 203 comprising a phase-change material eutectic material (water, paragraph [0035]).

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For claim 25: The heat transfer (thermal conduit/ heat pipe) 202 can be arranged as a closed loop liquid path or a high conductivity metal (paragraph [0034]).

For claim 27: The heat exchanger 204 is attached to the component by a thermal adhesive (conductive path).

For claim 28: Depending on the embodiment, the heat is conducted by convection or radiation (paragraph [0027]).

For claims 12-13: The phase change material is partially located in a sealed (evacuated) container (thermal barrier) so as to limit (thermally insulate) open area of the material.

For claim 14: The sealed container comprises a thermally hindering material phase change material.

10. Claims 1, 2, 4-5, 45, 47, 48, 50-51, 65, 67-73, 75-76, 78-81, 83-84 are rejected under 35 U.S.C. 102(e) as being anticipated by Parish et al. (U.S. 20030136548) [hereinafter Parish].

Parish discloses in Fig. 7 and paragraphs [0058-0060] a device in the field of applicant's endeavor comprising a heat exchanger plate (cold plate) 221 for removing heat from and thermally coupled to a thermal component 12, a heat sink (fins) 230, a thermal conduit 223 is a micro-tube (micro-capillary) part of the heat exchanger coupling the heat exchanger to the heat sink 230. The micro-capillary tubes 223 contain a heat transfer fluid. The micro-capillary tubes 223 contain a heat phase change eutectic (water) heat transfer fluid.

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 1, 10, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. 5713208) in view of Chrysler.

Chen discloses in Figs. 1-3 a device comprising a heat exchanger (plurality of thermoelectric coolers) 24 having a cold side 20 and a hot side 22, wherein the cold side is arranged to cool an object in contact with a cover 12, and the hot side (transfer conduit/ fins) of the thermoelectric coolers is arranged to transfer heat to a eutectic material of a heat sink 26. The eutectic heat sink comprises a container holding the eutectic material (water, col. 3, line 35).

Chen does not explicitly state that the object is a thermal component, as stated in claims 1, 10-11.

Chrysler discloses a device wherein a thermal an object is a thermal component.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the system, disclosed by Chen, so as to cool the thermal component, as taught by Chrysler, so as to maintain the temperature of the component within a predetermined level, and thus, to enable the operator to obtain accurate data from the borehole by using properly cooled electronic equipment.

12. Claims 1, 3-5, 10-11, 15-16, 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Simmons et al. (U.S. 6481216) [hereinafter Simmons] in view of Chrysler.

Simmons discloses in Figs. 1-5 a device comprising a heat exchanger 300 can be any conventional type of heat exchanger (col. 9, lines 43-44) comprising a heat transfer loop (thermal conduit/ tubing 240) 220, a pump (mini-pump, circulates 20000 milliliters per minute) 250 to circulate the transfer fluid 225 in a closed loop), and a valve 310 for controlling the transfer fluid 225 from the heat exchanger 300 to a heat sink made of a eutectic, phase change material 280.

Simmons does not explicitly state that a heat source is a thermal component, as stated in claim 1, with the remaining limitations of claims 1, 3-5, 10-11, 15-16, 25.

Chrysler teaches that a thermal component's temperature should be regulated.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the system, disclosed by Simmons, so as to cool the thermal component, as taught by Chrysler, so as to maintain the temperature of the component within a predetermined level, and thus, to enable the operator to obtain accurate data from the borehole by using properly cooled electronic equipment.

13. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chrysler in view of Bennett (U.S. 5165243).

Chrysler discloses the device as stated above in paragraph 7.



Chrysler does not explicitly teach to cool a component in a downhole (borehole), as stated in claim 6.

Bennett teaches that components of electrical circuits, etc.) in a borehole environment should be cooled.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the system, disclosed by Chrysler, so as to cool the component located in a borehole environment, so as to maintain the temperature of the component within a predetermined level, and thus, to enable the operator to obtain accurate data from the borehole by using properly cooled electronic equipment. The method steps will be met during the normal operation of the device stated above.

14. Claims 6, 46, 74 and 82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parish in view of Bennett (U.S. 5165243).

Parish discloses the device as stated above in paragraph 10.

Parish does not explicitly teach to cool a component in a downhole (borehole), as stated in claims 6, 46, 74 and 82.

Bennett teaches that components of electrical circuits, etc.) in a borehole environment should be cooled.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the system, disclosed by Parish, so as to cool the component located in a borehole environment, so as to maintain the temperature of the

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component within a predetermined level, and thus, to enable the operator to obtain accurate data from the borehole by using properly cooled electronic equipment.

The method steps will be met during the normal operation of the device stated above.

15. Claims 52-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parish in view of Chou.

Parish discloses the device as stated above in paragraph 10.

Parish does not explicitly teach that the limitations of claims 52-54.

Chou discloses a device in the field of applicant's endeavor.

For claims 52-53: The phase change material is partially located in a sealed (evacuated) container (thermal barrier) so as to limit (thermally insulate) open area of the material.

For claim 54: The sealed container comprises a thermally hindering material phase change material.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to position a part of the thermal management system (heat sink) in a sealed environment, as taught by Chou, so as to protect the heat sink from unexpected heat loss to the environment, in order to allow to use the phase change material for both, heating and cooling as necessary.

The method steps will be met during the normal operation of the device stated above.

16. Claims 55-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parish in view of Simmons.

Parish discloses the device as stated above in paragraph 10.

Parish does not explicitly teach that the heat transfer/ fluid transfer device has a mini-pump, as stated in claims 55-56.

Simmons discloses in Figs. 1-5 a device in the field of applicant's endeavor comprising a pump (mini-pump, circulates 20000 milliliters per minute) 250 to circulate the transfer fluid 225.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add a pump, as taught by Simmons, to the device disclosed by Parish, so as to controllably operate the device, in order to obtain more accuracy in thermal management of the component.

The method steps will be met during the normal operation of the device stated above.

17. Claims 17, 19, 21, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chrysler in view of Marsala (U.S. 6519955).

Chrysler discloses the device as stated above in paragraph 7.

For claims 19, 21, 23: As shown in Fig. 2, the heat exchangers are arranged in combination of series and parallel.

Chrysler does not explicitly teach a plurality of heat exchangers and more than one thermal conduit, as stated in claim 17, in combination with the remaining limitations of claims 19, 21, 23.

Marsala teaches in Figs. 1-2 a device in the field of applicant's endeavor comprising a plurality of heat exchangers 18 and plurality of thermal conduit branches 16 allowing fluid (two phase/ phase change liquid refrigerant) to flow from a pump 12 to the heat exchangers, wherein, heat exchangers are parallel and serial.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add a more heat exchangers and thermal conduits, as taught by Marsala, to the device disclosed by Chrysler, so as to use the device with a plurality of thermal components.

18. Claims 57, 59, 61, 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parish in view of Marsala (U.S. 6519955).

Parish discloses the device as stated above in paragraph 10.

Parish does not explicitly teach a plurality of heat exchangers and more than one thermal conduit, as stated in claim 57, in combination with the remaining limitations of claims 59, 61, 63.

Marsala teaches in Figs. 1-2 a device in the field of applicant's endeavor comprising a plurality of heat exchangers 18 and plurality of thermal conduit branches 16 allowing fluid (two phase/ phase change liquid refrigerant) to flow from a pump 12 to the heat exchangers, wherein, heat exchangers are parallel and serial.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add a more heat exchangers and thermal conduits, as

taught by Marsala, to the device disclosed by Parish, so as to use the device with a plurality of thermal components.

19. Claims 18, 20, 22, 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chrysler and Marsala as applied to claims 17, 19, 21, 23 above, and further in view of Simmons.

Chrysler and Marsala disclose the device as stated above in paragraph 17.

They do not explicitly disclose a valve, as stated in claims 18, 20, 22, 24.

Simmons discloses a device in the field of applicant's endeavor comprising a valve 310 for controlling the transfer fluid 225 from the heat exchanger 300 to a heat sink made of a eutectic, phase change material 280.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add a valve, as taught by Simmons, to the device disclosed by Chrysler, so as to enable the operator to control the cooling process, in order to provide the electronic component with a proper and timely cooling.

20. Claims 58, 60, 62, 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parish and Marsala as applied to claims 57, 59, 61, 63 above, and further in view of Simmons.

Parish and Marsala disclose the device as stated above in paragraph 18.

They do not explicitly disclose a valve.

Simmons discloses a device in the field of applicant's endeavor comprising a valve 310 for controlling the transfer fluid 225 from the heat exchanger 300 to a heat sink made of a eutectic, phase change material 280.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add a valve, as taught by Simmons, to the device disclosed by Parish, so as to enable the operator to control the cooling process, in order to provide the electronic component with a proper and timely cooling.

21. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

#### **Conclusion**

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art cited in the PTO-892 and not mentioned above disclose related devices and methods.

Any inquiry concerning this communication should be directed to the Examiner Verbitsky who can be reached at (571) 272-2253 Monday through Friday 8:00 to 4:00 ET.

GKV

Gail Verbitsky  
Primary Patent Examiner, TC 2800



October 06, 2004